```
=> d hist

     (FILE 'HOME' ENTERED AT 11:13:16 ON 20 JUL 2004)

     FILE 'REGISTRY' ENTERED AT 11:13:28 ON 20 JUL 2004
                E N-PROPANE/CN
L1              1 S E3
                E ETHANE/CN
L2              1 S E3
                E METHANE/CN
L3              1 S E3
                E PROPYLENE/CN
L4              1 S E3
L5              1 S N-BUTANE/CN
L6              1 S ISOBUTANE/CN
L7              1 S PENTANE/CN
L8              1 S 1,1,1,2-TETRAFLUOROETHANE/CN
L9              1 S PENTAFLUOROETHANE/CN

     FILE 'REGISTRY' ENTERED AT 11:16:34 ON 20 JUL 2004

     FILE 'CAPLUS' ENTERED AT 11:16:47 ON 20 JUL 2004
L10            16 S (L1 OR L2 OR L3 OR L4) AND (L5 AND L6 AND L7) AND L8 AND L9
```

DB=DWPI; PLUR=YES; OP=ADJ

L9	us-6428720-$.did.	1	L9
L8	us-6508950-$.did.	1	L8

DB=USPT; PLUR=YES; OP=ADJ

L7	r-601	1	L7
L6	r-1270	4	L6
L5	r-134a and r-290	14	L5
L4	L2 and refrigerant	7	L4
L3	L2 and 134a	0	L3
L2	rhodia.as.	477	L2
L1	tieken.in.	11	L1

END OF SEARCH HISTORY

Reg/ CA + 7/20/04

Please note that search-term pricing does apply when
conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. For more
information enter HELP PROP at an arrow prompt in the file or refer
to the file summary sheet on the web at:
http://www.cas.org/ONLINE/DBSS/registryss.html

```
=> e n-propane/cn
E1            1     N-PROPAN-3-OL-N-METHYLANILINE/CN
E2            1     N-PROPANAL/CN
E3            1 --> N-PROPANE/CN
E4            1     N-PROPANENITRILE/CN
E5            1     N-PROPANESULFONAMIDE/CN
E6            1     N-PROPANESULFONATE/CN
E7            1     N-PROPANESULFONYL CHLORIDE/CN
E8            1     N-PROPANESULFONYL-(S)-4-(METHYLSULFANYL)BUTYRAMIDE/CN
E9            1     N-PROPANETHIOL/CN
E10           1     N-PROPANOL/CN
E11           1     N-PROPANOL ACETATE/CN
E12           1     N-PROPANOL BUTYRATE/CN

=> s e3
L1            1 N-PROPANE/CN

=> e ethane/cn
E1            1     ETHANAMINIUM-2-14C, N,N,N-TRIMETHYL-2-OXO-2-(TETRADECYL-9,10
                    -T2-OXY)-, CHLORIDE/CN
E2            1     ETHANANMINE, N-(2,2-DINITROETHYL)-2,2-DINITRO-, ION(1-), POT
                    ASSIUM/CN
E3            1 --> ETHANE/CN
E4            1     ETHANE 1,2-BIS(METHYLPHOSPHINIC ACID)/CN
E5            1     ETHANE AZOMETHANE, DIOXIDE/CN
E6            1     ETHANE CATION RADICAL/CN
E7            1     ETHANE DIAMINE N,N'-BIS(2-THIENYL METHYLENE)/CN
E8            1     ETHANE DIBROMIDE-TETRABROMOBISPHENOL A COPOLYMER/CN
E9            1     ETHANE DIMETHANESULFONATE/CN
E10           1     ETHANE HEXACHLORIDE/CN
E11           1     ETHANE ION(1+)/CN
E12           1     ETHANE ION(2+)/CN

=> s e3
L2            1 ETHANE/CN

=> e methane/cn
E1            1     METHANDROSTENOLONE GLUCURONIDE/CN
E2            1     METHANDROSTENOLONE SULFATE/CN
E3            1 --> METHANE/CN
E4            1     METHANE (11CH4)/CN
E5            1     METHANE (13CD4)/CN
E6            1     METHANE (13CH2D2)/CN
E7            1     METHANE (13CH3D)/CN
E8            1     METHANE (13CH4)/CN
E9            1     METHANE (13CHD3)/CN
E10           1     METHANE (CD2T2)/CN
E11           1     METHANE (CD3H+)/CN
E12           1     METHANE (CD4)/CN

=> s e3
L3            1 METHANE/CN
```

```
=> e propylene/cn
E1            1     PROPYLDOPAMINE HYDROCHLORIDE/CN
E2            1     PROPYLEINE/CN
E3            1 --> PROPYLENE/CN
E4            1     PROPYLENE ACETAL/CN
E5            1     PROPYLENE ACETATE/CN
E6            1     PROPYLENE ACRYLATE/CN
E7            1     PROPYLENE BIS(DIETHYL ORTHOACETATE)/CN
E8            1     PROPYLENE BIS(PROPYLENE CYCLIC ORTHOACETATE)/CN
E9            1     PROPYLENE BORATE/CN
E10           1     PROPYLENE BORATE,  ((C3H6O2)BO)2(C3H6)/CN
E11           1     PROPYLENE BORATE, ANHYDRIDE WITH (PHO)2(HO)PO/CN
E12           1     PROPYLENE BROMOHYDRIN/CN

=> s e3
L4            1 PROPYLENE/CN

=> s n-butane/cn
L5            1 N-BUTANE/CN

=> s isobutane/cn
L6            1 ISOBUTANE/CN

=> s pentane/cn
L7            1 PENTANE/CN

=> s 1,1,1,2-tetrafluoroethane/cn
L8            1 1,1,1,2-TETRAFLUOROETHANE/CN

=> s pentafluoroethane/cn
L9            1 PENTAFLUOROETHANE/CN

=> file reg
COST IN U.S. DOLLARS                          SINCE FILE      TOTAL
                                                   ENTRY    SESSION
FULL ESTIMATED COST                               41.97      42.18

FILE 'REGISTRY' ENTERED AT 11:16:34 ON 20 JUL 2004
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2004 American Chemical Society (ACS)

Property values tagged with IC are from the ZIC/VINITI data file
provided by InfoChem.

STRUCTURE FILE UPDATES:   19 JUL 2004  HIGHEST RN 713066-32-1
DICTIONARY FILE UPDATES:  19 JUL 2004  HIGHEST RN 713066-32-1

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2004

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available. For more
information enter HELP PROP at an arrow prompt in the file or refer
to the file summary sheet on the web at:
http://www.cas.org/ONLINE/DBSS/registryss.html

=> file caplus
COST IN U.S. DOLLARS                          SINCE FILE      TOTAL
                                                   ENTRY    SESSION
FULL ESTIMATED COST                                0.42      42.60
```

```
FILE 'CAPLUS' ENTERED AT 11:16:47 ON 20 JUL 2004
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)
```

Copyright of the articles to which records in this database refer is held by the publishers listed in the PUBLISHER (PB) field (available for records published or updated in Chemical Abstracts after December 26, 1996), unless otherwise indicated in the original publications. The CA Lexicon is the copyrighted intellectual property of the American Chemical Society and is provided to assist you in searching databases on STN. Any dissemination, distribution, copying, or storing of this information, without the prior written consent of CAS, is strictly prohibited.

```
FILE COVERS 1907 - 20 Jul 2004  VOL 141 ISS 4
FILE LAST UPDATED: 19 Jul 2004  (20040719/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.


=> d hist

     (FILE 'HOME' ENTERED AT 11:13:16 ON 20 JUL 2004)

     FILE 'REGISTRY' ENTERED AT 11:13:28 ON 20 JUL 2004
                E N-PROPANE/CN
L1            1 S E3
                E ETHANE/CN
L2            1 S E3
                E METHANE/CN
L3            1 S E3
                E PROPYLENE/CN
L4            1 S E3
L5            1 S N-BUTANE/CN
L6            1 S ISOBUTANE/CN
L7            1 S PENTANE/CN
L8            1 S 1,1,1,2-TETRAFLUOROETHANE/CN
L9            1 S PENTAFLUOROETHANE/CN

     FILE 'REGISTRY' ENTERED AT 11:16:34 ON 20 JUL 2004

     FILE 'CAPLUS' ENTERED AT 11:16:47 ON 20 JUL 2004

=> s (l1 or l2 or l3 or l4) and (l5 and l6 and l7) and l8 and l9
         32104 L1
         29859 L2
        106167 L3
         38698 L4
         23743 L5
         13708 L6
         17107 L7
          4530 L8
          1810 L9
L10         16 (L1 OR L2 OR L3 OR L4) AND (L5 AND L6 AND L7) AND L8 AND L9

=> d all 1-16

L10  ANSWER 1 OF 16  CAPLUS  COPYRIGHT 2004 ACS on STN
AN   2004:333796  CAPLUS
DN   140:323485
```

ED Entered STN: 23 Apr 2004
TI Refrigerant blend compositions
IN Chambers, Owen Ross; Roberts, Neil Andre
PA Rhodia Organique Fine Limited, UK
SO PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C09K005-04
CC 48-5 (Unit Operations and Processes)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004033582	A1	20040422	WO 2003-GB4421	20031013

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI GB 2002-23724 A 20021011

AB Refrigerant composition are disclosed which comprises: (a) pentafluorethane, trifluoromethoxydifluoromethane or hexafluorocyclopropane, or a mixture of two or more thereof, in an amount of at least 75% based on the weight of the composition, (b) 1,1,1,2- or 1,1,2,2-tetrafluoroethane, trifluoromethoxypentafluoroethane, 1,1,1,2,2,3,3-heptafluoropropane or a mixture of two or more thereof, in an amount of from 10 to 20% by weight based on the weight of the composition and (c) an ethylenically unsatd. or saturated hydrocarbon, optionally containing one or more oxygen atoms, with a b.p. from -50° to +35°, or a mixture thereof in an amount from 1% to 4% by weight based on the weight of the composition the weight ratio of component (a): component (b) being at least 4:1.

ST refrigerant blend fluorocarbon ether hydrocarbon thermodn efficiency PVT

IT Ethers, uses
Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(b.p. -50° to 35°C; refrigerant blend compns.)

IT Dew point
(design parameter for evaporator; refrigerant blend compns.)

IT Hydrocarbons, processes
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(fluoro, b.p. <40°, refrigerant component; refrigerant blend compns.)

IT Climate
(greenhouse effect, refrigerant replacements to mitigate; refrigerant blend compns.)

IT Bubble point
Equation of state
Refrigerants
Thermodynamic cycle
(refrigerant blend compns.)

IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(unsatd., b.p. -50° to 35°C; refrigerant blend compns.)

IT Vapor pressure

(vs. temperature of refrigerants; refrigerant blend compns.)
IT **354-33-6**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(R 125, refrigerant component; refrigerant blend compns.)
IT **811-97-2**, 1,1,1,2-Tetrafluoroethane
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(R 134a, refrigerant component; refrigerant blend compns.)
IT 2252-84-8, 1,1,1,2,2,3,3-Heptafluoropropane
RL: TEM (Technical or engineered material use); USES (Uses)
(R 227ca, refrigerant component; refrigerant blend compns.)
IT **106-97-8**, Butane, processes
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(R 600, refrigerant component; refrigerant blend compns.)
IT **75-28-5**, Isobutane
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(R 600a; refrigerant blend compns.)
IT 3822-68-2, Trifluoromethoxydifluoromethane
RL: TEM (Technical or engineered material use); USES (Uses)
(R-E 125, refrigerant component; refrigerant blend compns.)
IT 158675-78-6, R 407C
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(blend of R 125, R 134a, and R 32 (difluoromethane); refrigerant blend compns.)
IT 150743-07-0, R 404A
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(refrigerant blend compns.)
IT **74-98-6**, Propane, uses 75-19-4, Cyclopropane 75-46-7, Trifluoromethane 78-78-4, Isopentane **109-66-0**, Pentane, uses **115-07-1**, Propene, uses 115-10-6, Dimethyl ether 287-23-0, Cyclobutane 503-30-0, Oxetan 540-67-0, Ethyl methyl ether 594-11-6, Methylcyclopropane 665-16-7, Trifluoromethoxypentafluoroethane
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant component; refrigerant blend compns.)
IT 75-45-6, R 22
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(refrigerant; refrigerant blend compns.)
RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Forbes, P; WO 9508602 A 1995 CAPLUS
(2) Honeywell Int Inc; WO 0226912 A 2002 CAPLUS
(3) Rhodia Ltd; GB 2356867 A 2001 CAPLUS
(4) Sanyo Electric Co; EP 0659862 A 1995 CAPLUS
(5) Victor, T; WO 0123493 A 2001 CAPLUS

L10 ANSWER 2 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2004:269679 CAPLUS
DN 140:289492
ED Entered STN: 02 Apr 2004
TI Fluorocarbon-hydrocarbon refrigerant blend
IN Tieken, James B.

PA USA
SO U.S. Pat. Appl. Publ., 8 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM F25D001-00
ICS C09K005-00
NCL 252067000
CC 48-5 (Unit Operations and Processes)
Section cross-reference(s): 51, 59

applicant

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 2004061091	A1	20040401	US 2003-672505	20030926
WO 2004031318	A1	20040415	WO 2003-US30474	20030926

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI US 2002-415340P P 20021001

AB A refrigerant blend is described for replacing refrigerant R-22 (chlorodifluoromethane) in refrigeration systems designed to use R-22 as the refrigerating fluid. The refrigerant blend comprises R-134a (1,1,1,2-tetrafluoroethane), R-125 (pentafluoroethane), a hydrocarbon component, and, optionally, R-32 (difluoromethane). The hydrocarbon component comprises ≥2 hydrocarbons having b.ps. that bracket the b.p. of R-134a (-15° F, -26° C). The hydrocarbons in one group, designated as Group A, have b.ps. lower than the b.p. of R-134a. The hydrocarbons in the other group, designated Group B, have b.ps. higher than that of R-134a.

ST fluorocarbon hydrocarbon refrigerant blend

IT Hydrocarbons, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(fluoro; fluorocarbon-hydrocarbon refrigerant blend)

IT Air conditioning
Refrigerants
Refrigeration
(fluorocarbon-hydrocarbon refrigerant blend)

IT Hydrocarbons, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(fluorocarbon-hydrocarbon refrigerant blend)

IT **109-66-0**, Pentane, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(R-601; fluorocarbon-hydrocarbon refrigerant blend)

IT **74-82-8**, R-50, uses **74-84-0**, R-170, uses **74-98-6**, R-290, uses 75-10-5, R-32 **75-28-5**, R-600a **106-97-8**, R-600, uses **115-07-1**, R-1270, uses **354-33-6**, R-125 **811-97-2**, R-134a
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(fluorocarbon-hydrocarbon refrigerant blend)

L10 ANSWER 3 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2004:119646 CAPLUS

DN 140:148447
ED Entered STN: 13 Feb 2004
TI Environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors
IN Poole, John Edward; Powell, Richard; Thomas, James Victor
PA Refrigerant Products Ltd., UK
SO U.S. Pat. Appl. Publ., 4 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM C09K005-00
NCL 252067000
CC 48-5 (Unit Operations and Processes)
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 2004026655	A1	20040212	US 2003-393203	20030318
PRAI GB 2002-6413	A	20020319		

AB An environmentally friendly hydrofluorocarbon refrigerant for centrifugal compressors consist of a mixture of R134a (1,1,1,2-tetrafluoroethane), R 227ea (1,1,1,2,3,3,3-heptafluoropropane), optionally R 125 (pentafluoroethane), and ≤6.5 weight% (preferably 2-5 weight%) of a hydrocarbon component selected from butane, isobutane, propane, cyclopentane, isopentane, neopentane, and pentane. The refrigerant mixts. are suitable replacements for R 12 (dichlorodifluoromethane) refrigerant and are characterized by a maximum vapor pressure of ≤2 bar greater than that of R 12 at 45° and an average mol. weight of 121.
ST hydrofluorocarbon refrigerant centrifugal compressor; fluoroethane perfluoropropane isobutane refrigerant centrifugal compressor
IT Compressors
(centrifugal; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT Refrigerants
(environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoro, mixts. with hydrocarbons; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(mixts. with hydrofluorocarbons; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT **74-98-6**, Propane, uses **75-28-5**, Isobutane 78-78-4, Isopentane **106-97-8**, Butane, uses **109-66-0**, Pentane, uses 287-92-3, Cyclopentane 463-82-1, Neopentane
RL: TEM (Technical or engineered material use); USES (Uses)
(mixts. with hydrofluorocarbons; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT **354-33-6**, Pentafluoroethane 431-89-0, 1,1,1,2,3,3,3-Heptafluoropropane **811-97-2**, 1,1,1,2-Tetrafluoroethane
RL: TEM (Technical or engineered material use); USES (Uses)
(mixts.; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)
IT 652129-13-0
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant; environmentally friendly hydrofluorocarbon-hydrocarbon refrigerant mixture mixture for centrifugal compressors)

L10 ANSWER 4 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:811278 CAPLUS

DN 140:28897
ED Entered STN: 16 Oct 2003
TI Modelling enthalpy and entropy of pure and mixed refrigerants with an innovative corresponding states method
AU Scalabrin, G.; Grigiante, M.; Cristofoli, G.
CS Dipartimento di Fisica Tecnica, Universita di Padova, Padua, I-35131, Italy
SO International Journal of Refrigeration (2003), 26(8), 936-950
CODEN: IJRFDI; ISSN: 0140-7007
PB Elsevier Science Ltd.
DT Journal
LA English
CC 48-5 (Unit Operations and Processes)
Section cross-reference(s): 69
AB In this work an original improvement of the corresponding states technique is developed and a new model, based on a three parameters CS format, is proposed to predict the enthalpy and the entropy of the new generation halogenated alkanes fluids together with some alkanes. Limiting the anal. of the selected fluids to a specific thermodn. property behavior, an appropriate conformality approach can be deduced, which allows to set up a predictive model of high accuracy level on a wide range of the enthalpy and entropy surfaces. The fundamentals of the model are innovative scaling parameters deduced from the enthalpy of vaporization and from two dedicated equations, belonging to the selected family of fluids. This allows to set up innovative models following a CS format. Through the introduction of advanced mixing rules, the models can be simply extended to calculate the corresponding properties for mixts. The proposed models allow also the calcn. of VLE for systems of rather regular behavior. The required inputs for a pure target fluid are an ideal gas isobaric heat capacity correlation, a single value of saturated liquid d. and of vaporization enthalpy; if the last one is lacking, a single value of vapor pressure can be alternatively supplied. For non-azeotropic mixts. the enthalpy and entropy models are predictive, whereas in case of azeotropy VLE calcns. are possibly only applying regressed interaction coeffs. Due to the lack of accurate exptl. enthalpy data and to the particular nature of the entropy function, the validation of the models is proposed against fundamental dedicated EoS available, both for pure and mixts., for a significant number of the studied family of fluids. The predictive character of the proposed approach as well as the high performances reached, make these models particularly suitable for the new families of fluids regarding advanced technol. applications.
ST refrigerant enthalpy entropy modeling corresponding state; halogenated alkane refrigerant enthalpy entropy modeling
IT Corresponding states
Enthalpy
Entropy
Refrigerants
Simulation and Modeling, physicochemical
(modeling of enthalpy and entropy of pure and mixed halogenated alkane refrigerants with corresponding states method)
IT Alkanes, properties
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(modeling of enthalpy and entropy of pure and mixed halogenated alkane refrigerants with corresponding states method)
IT **74-82-8**, Methane, properties **74-84-0**, Ethane, properties **74-98-6**, Propane, properties 75-10-5, R32, Refrigerant **75-28-5**, Iso-butane 75-37-6, R152a 75-45-6 75-68-3, R142b 75-69-4, R11, Refrigerant 75-71-8, R12, Refrigerant 76-14-2 78-78-4, Iso-pentane **106-97-8**, n-Butane, properties **109-66-0**, n-Pentane, properties 110-54-3, Hexane, properties 142-82-5, Heptane, properties 306-83-2, R123 **354-33-6**, R125 **811-97-2**, R134a
RL: PRP (Properties); TEM (Technical or engineered material use); USES

150743-07-0, R-404A 158675-77-5, R-406A 158675-78-6, R-407A
158675-79-7, R-408A 164671-97-0, R 405A 174819-20-6, R-411A
188653-05-6, R-413A 406214-80-0, R 412A 406214-81-1, R 509A
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant; fluorocarbon refrigerant compns.)

IT 60-29-7, Ethyl ether, uses **74-82-8**, Methane, uses **74-84-0**, Ethane, uses 74-85-1, Ethylene, uses **74-98-6**, Propane, uses **75-28-5**, Isobutane 75-37-6, 1,1-Difluoroethane 78-78-4, Isopentane **106-97-8**, Butane, uses 107-31-3, Methyl formate **109-66-0**, Pentane, uses **115-07-1**, Propylene, uses 115-10-6, Dimethyl ether 124-38-9, Carbon dioxide, uses 287-92-3, Cyclopentane 353-36-6, Fluoroethane 463-82-1, Neopentane 2314-97-8, Iodotrifluoromethane 2551-62-4, Sulfur hexafluoride 3822-68-2, Pentafluorodimethyl ether 25190-06-1, Polybutylene glycol
RL: TEM (Technical or engineered material use); USES (Uses)
(solubilizing agent; fluorocarbon refrigerant compns.)

L10 ANSWER 6 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:145516 CAPLUS
DN 136:265205
ED Entered STN: 26 Feb 2002
TI A corresponding states predictive viscosity model based on a new scaling parameter: application to hydrocarbons, halocarbons and mixtures
AU Scalabrin, G.; Cristofoli, G.; Grigiante, M.
CS Dipartimento di Fisica Tecnica, Universita di Padoca, Padoca, I-35131, Italy
SO International Journal of Energy Research (2002), 26(1), 1-26
CODEN: IJERDN; ISSN: 0363-907X
PB John Wiley & Sons Ltd.
DT Journal
LA English
CC 48-11 (Unit Operations and Processes)
AB A three-parameter corresponding states (CS) model is developed, importing methods formerly studied for the volumetric representation of fluids. The three parameters are critical temperature, pressure and a viscosity scaling factor, ψ, defined from exptl. saturated liquid viscosity data or, when these are unavailable, from a single exptl. point. Two reference fluids are chosen both for their ψ factor value and because the corresponding viscosity dedicated equations (VDE) are available. On the basis of the three-parameter CS model proposed by A. S. Teja (1980) for volumetric properties, the reduced viscosity of a third fluid is obtained in reduced P, T variables interpolating that of the two reference fluids, calculated at the same reduced temperature and pressure. by ψ. Where the transport property is known along the saturation line at least, an improvement is introduced by correcting the ψ factor with a temperature-dependent function fitted on these data. The model is then extended to mixts. using the one-fluid model approach, in a completely predictive mode with respect to the mixture The accuracy for both pure fluids and mixts. is comparable with that of the reference fluids' equations, while in the unimproved and improved mode the amount of input data is very limited. Also, comparison with a four-parameter CS model and with an ECS model confirms the accuracy of the present technique. Considering the predictive nature of the model and the scattering of the available exptl. data. the mean accuracy is good and more than satisfactory for the purposes of tech. applications.
ST hydrocarbon mixt corresponding state predictive viscosity model scaling parameter; halocarbon mixt corresponding state predictive viscosity model scaling parameter
IT Corresponding states
Viscosity
(applications of corresponding states predictive viscosity model based on scaling parameter to hydrocarbons and halocarbons and mixts.)
IT Hydrocarbons, processes

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)
(applications of corresponding states predictive viscosity model based on scaling parameter to hydrocarbons and halocarbons and mixts.)

IT Hydrocarbons, processes
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)
(halo; applications of corresponding states predictive viscosity model based on scaling parameter to hydrocarbons and halocarbons and mixts.)

IT 71-43-2, Benzene, processes **74-82-8**, Methane, processes **74-84-0**, Ethane, processes **74-98-6**, Propane, processes 75-10-5, R32, Refrigerant **75-28-5**, Isobutane 75-37-6, R152a 75-45-6 **106-97-8**, n-Butane, processes **109-66-0**, n-Pentane, processes 110-54-3, n-Hexane, processes 111-65-9, n-Octane, processes 112-40-3, n-Dodecane 124-18-5, n-Decane 142-82-5, n-Heptane, processes 306-83-2, R123 **354-33-6**, R125 359-35-3, R134 420-46-2, R143a 431-63-0, R236Ea **811-97-2**, R134a 1717-00-6, R141b 2837-89-0, R124
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)
(applications of corresponding states predictive viscosity model based on scaling parameter to hydrocarbons and halocarbons and mixts.)

RE.CNT 101 THERE ARE 101 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Abdulagatov, I; Berichte Bunsengesellschaft Physkalische Chemie 1996, V100(2), P148 CAPLUS
(2) Abe, Y; Physica 1978, V93A, P155 CAPLUS
(3) Agaev, N; Doklady Physical Chemistry 1963, V151(3), P635
(4) Agaev, N; Gazovaya Promyshelennest 1963, V8, P45 CAPLUS
(5) Agaev, N; Gazovaya Promyshelennost 1963, V8(45), P50
(6) Arnemann, A; Proceedings of the 18th International Congress Refrigeration (I I R) 1991, VII, P379
(7) Assael, M; International Journal of Thermophysics 1991, V12(5), P801 CAPLUS
(8) Assael, M; International Journal of Thermophysics 1994, V15(4), P575
(9) Assael, M; International Journal of Thermophysics 1994, V15(4), P591 CAPLUS
(10) Assael, M; International Journal of Thermophysics 1994, V15(5), P779 CAPLUS
(11) Aucejo, A; Journal of Chemical Engineering Data 1995, V40(1), P141 CAPLUS
(12) Baron, J; Journal of Chemical Engineering Data 1959, V4(3), P283
(13) Carmichael, L; Journal of Chemical Engineering Data 1963, V8(1), P94
(14) Carmichael, L; Journal of Chemical Engineering Data 1964, V9(3), P411 CAPLUS
(15) Carmichael, L; Journal of Chemical Engineering Data 1969, V14(1), P27 CAPLUS
(16) Carmichael, L; Journal of Chemical and Engineering Data 1963, V8(4), P612 CAPLUS
(17) Diller, D; Fluid Phase Equilibria 1993, V88, P251 CAPLUS
(18) Diller, D; High Temperature-High Pressure 1989, V21, P613 CAPLUS
(19) Diller, D; International Journal of Refrigeration 1993, V16(1), P19 CAPLUS
(20) Diller, D; International Journal of Thermophys 1985, V6(1), P43 CAPLUS
(21) Diller, D; International Journal of Thermophysics 1993, V14(1), P55 CAPLUS
(22) Diller, D; Journal of Chemical Engineering Data 1982, V27(3), P240 CAPLUS
(23) Diller, D; Physica 1981, V108a, P143 CAPLUS
(24) Dolan, J; Journal of Chemical and Engineering Data 1963, V8(3), P396 CAPLUS
(25) Dymond, J; International Journal of Thermophysics 1980, V1(4), P331 CAPLUS
(26) Eakin, B; Journal of Chemical and Engineering Data 1962, V7(1), P33
(27) Ely, J; Industrial and Engineering Chemistry, Fundamentals 1981, V20, P323 CAPLUS
(28) Geist, J; Industrial and Engineering Chemistry 1946, V18(10), P611
(29) Geller, V; International Journal of Thermophysics 1994, V17(1), P75
(30) Giddins, J; Journal of Chemical Physics 1966, V45(2), P578
(31) Giller, E; Industrial and Engineering Chemistry 1949, V41(9), P2067
(32) Gonzales, M; Journal of Chemical and Engineering Data 1966, V11(3), P357

(33) Gonzales, M; Journal of Chemical and Engineering Data 1968, V13(1), P66
(34) Heide, R; DKV-Tagungsbericht 1996, V23, P225
(35) Heiks, J; Journal of Chemical Physics 1956, V60(8), P1025
(36) Hendl, S; International Journal of Thermophysics 1994, V15, P1 CAPLUS
(37) Hogenboom, D; Journal of Chemical Physics 1967, V46(7), P2586 CAPLUS
(38) Huang, E; AIChE Journal 1966, V12(5), P932 CAPLUS
(39) Huang, E; AIChE Journal 1967, V13(5), P846 CAPLUS
(40) Huber, M; High Temperature-High Pressure 1992, V11, P571
(41) Huber, M; Private communication 1996
(42) Jonas, J; Journal of Chemical Physics 1980, V84(1), P109 CAPLUS
(43) Kesler, M; AIChE Journal 1975, V21, P510
(44) Knapstad, B; Journal of Chemical and Engineering Data 1989, V34(1), P37 CAPLUS
(45) Krauss, R; International Journal of Thermophysics 1993, V14(4), P951 CAPLUS
(46) Krauss, R; International Journal of Thermophysics 1996, V17(4), P731 CAPLUS
(47) Kumagai, A; International Journal of Thermol Physics 1993, V14(2), P339 CAPLUS
(48) Kumagai, A; International Journal of Thermophysics 1991, V12(1), P105 CAPLUS
(49) Laesecke, A; Journal of Chemical and Engineering Data 1996, V41, P59 CAPLUS
(50) Laesecke, A; Journal of Physical and Chemical Reference Data 1990, V19(5), P1089 CAPLUS
(51) Lee, A; Journal of Chemical and Engineering Data 1965, V10(2), P101 CAPLUS
(52) Li-Zhong, H; Journal of Chemical and Engineering Data 1995, V40(3), P650
(53) Mayinger, F; DFG-Forschungsvorhaben, Abschlußbericht 1991
(54) McLinden, M; NIST Thermodynamic Properties of Refrigerants and Refrigerant Mixtures Database, Version 5.0 (REFPROP) 1995
(55) Medani, M; Canadian Journal of Chemical Engineering 1977, V55, P203 CAPLUS
(56) Nabizadeh, H; High Temperature-High Pressure 1992, V24, P221 CAPLUS
(57) Nabizadeh, H; Proceedings of the 13th Symposium on Thermophysical Properties 1997, P440
(58) Nagaoka, K; Journal of Chemical and Engineering Japan 1986, V19(4), P263 CAPLUS
(59) Okeson, K; International Journal of Thermophysics 1991, V12(1), P119 CAPLUS
(60) Okubo, T; International Journal of Thermophysics 1992, V13(3), P401 CAPLUS
(61) Okubo, T; International Journal of Thermophysics 1992, V13(6), P931 CAPLUS
(62) Oliveira, C; International Journal of Thermophysics 1992, V13(5), P773 CAPLUS
(63) Oliveira, C; International Journal of Thermophysics 1993, V14(6), P1131 CAPLUS
(64) Oliveira, C; International Journal of Thermophysics 1993, V14(1), P33 CAPLUS
(65) Padua, A; International Journal of Thermophysics 1996, V17(4), P781 CAPLUS
(66) Padua, A; Journal of Chemical and Engineering Data 1996, V41(6), P1488 CAPLUS
(67) Padua, A; Journal of Chemical and Engineering Data 1996, V41(4), P731 CAPLUS
(68) Parisot, P; Journal of Chemical and Engineering Data 1961, V6(2), P263
(69) Phibbs, M; Journal of Chemical Physics 1951, V19(11), P1420
(70) Phillips, T; ASHRAE Transactions 1970, V76(2), P146
(71) Pitzer, K; Journal of the American Chemical Society 1955, V77, P3433 CAPLUS
(72) Rastorguyev, Y; Fluids Mechanics (USSR) 1974, V3(4), P156
(73) Rasulov, S; High Temperature 1994, V32(4), P469
(74) Ridgway, K; Journal of Chemical and Engineering Data 1967, V12(4), P509 CAPLUS
(75) Ripple, D; Journal of Chemical and Engineering Data 1993, V38(4), P560 CAPLUS
(76) Rowley, R; Private communication 1993
(77) Sage, B; Industrial Engineering Chemistry 1938, V30(7), P829

(78) Sage, B; Industrial Engineering Chemistry 1939, V31(2), P223
(79) Scalabrin, G; Proceedings of the 13th Symposium on Thermophysical Properties 1997, P309
(80) Scalabrin, G; Proceedings of the Eleventh Heat Transfer Conference 1998, V7, P39
(81) Smith, A; Industrial Engineering Chemistry 1943, V35(6), P705
(82) Sun, L; Journal of Chemical and Engineering Data 1996, V41(2), P292 CAPLUS
(83) Swift, G; AIChE Journal 1959, V5(1), P98
(84) Swift, G; AIChE Journal 1960, V6(3), P415
(85) Takahashi, M; Journal of Chemical and Engineering Data 1987, V32, P98 CAPLUS
(86) Takahashi, M; Journal of Chemical and Engineering Data 1995, V40(4), P900
(87) Takahashi, M; Transactions of the JAR 1987, V4(3), P25
(88) Tanaka, Y; International Journal of Thermophysics 1991, V12(2), P245 CAPLUS
(89) Tanaka, Y; International Journal of Thermophysics 1996, V17(2), P293 CAPLUS
(90) Teja, A; AIChE Journal 1980, V26(3), P337 CAPLUS
(91) Teja, A; Chemical Engineering Communications 1986, V49, P69 CAPLUS
(92) Tillner-Roth, R; International Journal of Thermophysics 1995, V16(1), P91 CAPLUS
(93) Tillner-Roth, R; Journal of Physical of Chemical 1994, V23(5), P657 CAPLUS
(94) van der Gulik, P; International Journal of Thermophysics 1993, V14(4), P851 CAPLUS
(95) Vogel, E; Journal of Physical and Chemical 1998, V27(5), P947 CAPLUS
(96) Willman, B; Chemical Engineering Journal 1988, V37, P65 CAPLUS
(97) Wilson, L; Fluid Phase Equilibria 1992, V80, P167 CAPLUS
(98) Wong, D; Fluid Phase Equilibria 1983, V14, P79 CAPLUS
(99) Wong, D; Industrial and Engineering Chemistry Fundamentals 1984, V23, P38 CAPLUS
(100) Younglove, B; Journal of Physical and Chemical 1987, V16(4), P577 CAPLUS
(101) Younglove, B; Journal of Physical and Chemical 1994, V23(5), P731 CAPLUS

L10 ANSWER 7 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:185836 CAPLUS
DN 134:223769
ED Entered STN: 16 Mar 2001
TI Insulating extruded foams having monovinyl aromatic polymers with a broad molecular weight distribution and their manufacture
IN Duffy, John D.; Vo, Chau V.; Mason, Jeffrey J.; Paquet, Andrew N.
PA Dow Chemical Co., USA
SO PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C08J009-14
ICS C08J009-00
CC 38-3 (Plastics Fabrication and Uses)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001018098	A1	20010315	WO 2000-US24115	20000901
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	EP 1214372	A1	20020619	EP 2000-957943	20000901
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				

	TR 200200531	T2	20020621	TR 2002-20020053120000901
	JP 2003508613	T2	20030304	JP 2001-522316 20000901
	NO 2002001038	A	20020430	NO 2002-1038 20020301
PRAI	US 1999-152530P	P	19990903	
	US 1999-152845P	P	19990908	
	US 1999-153320P	P	19990910	
	WO 2000-US24115	W	20000901	

AB Title closed-cell foams show a thermal conductivity (TC; based on EN-13164) of ≤35 mW/m-°K. and comprise (a) polymers containing ≥50% monovinyl aromatic monomers and having an weight-average mol. weight of (Mw) 130,000-400,000 and polydispersity (Mw/Mn) of ≥2.5 and (b) blowing agent residues from mixts. of 30-90% fluoro hydrocarbons as primary blowing agents (optionally and 0-50% CO2) and 10-70% secondary blowing agents selected from C1-4 alcs., C1-5 linear or cyclic hydrocarbons, alkyl halides, and water. A polystyrene with Mw of 150,000 and Mw/Mn of 3.29 was extruded along with 10 phr blowing agent (6.9:0.6:2.5 HFC 134A, CO2, and EtOH) gave a foam with d. 37.8 kg/m3, cell size 0.21 mm, open cell content 1.8%, and TC 28.6 mW/m-°K.

ST thermal insulator foam styrene polymer broad mol wt distribution; blowing agent blend manuf styrene resin foam thermal insulator

IT Alcohols, uses
RL: MOA (Modifier or additive use); USES (Uses)
(C1-4; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Hydrocarbons, uses
RL: MOA (Modifier or additive use); USES (Uses)
(C1-5; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(IR attenuator; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Hydrocarbons, uses
RL: MOA (Modifier or additive use); USES (Uses)
(fluoro; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Blowing agents
Polydispersity
Thermal insulators
(high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Alkyl halides
RL: MOA (Modifier or additive use); USES (Uses)
(high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT Vinyl compounds, uses
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(polymers, aromatic; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT 7782-42-5, Graphite, uses 13463-67-7, Titania, uses
RL: MOA (Modifier or additive use); USES (Uses)
(IR attenuator; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT 7429-90-5, Aluminum, uses
RL: MOA (Modifier or additive use); USES (Uses)
(flake, IR attenuator; high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, Isopropanol, uses 71-23-8, n-Propanol, uses **74-82-8**, Methane, uses **74-84-0**, Ethane, uses **74-98-6**, Propane, uses 75-10-5, HFC 32 **75-28-5**, Isobutane 75-37-6, HFC 152A 75-73-0, Perfluoromethane 76-16-4, Perfluoroethane 76-19-7, Perfluoropropane 78-78-4, Isopentane **106-97-8**, n-Butane, uses **109-66-0**,

n-Pentane, uses 115-25-3, Perfluorocyclobutane 124-38-9, Carbon dioxide, uses 287-23-0, Cyclobutane 287-92-3, Cyclopentane 353-36-6, HFC 161 **354-33-6**, HFC 125 355-25-9, Perfluorobutane 359-35-3, HFC 134 406-58-6, HFC 365mfc 420-46-2, HFC 143A 421-07-8, HFC 263fb 430-61-5, HFC 272fb 431-89-0, HFC227ea 460-73-1, HFC 245fa 463-82-1, Neopentane 593-53-3, Methyl fluoride **811-97-2**, HFC 134A 2252-84-8, Heptafluoropropane 7732-18-5, Water, uses
RL: MOA (Modifier or additive use); USES (Uses)
(high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

IT 9003-53-6, Polystyrene
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(high-polydispersity styrene resin-based extruded thermal insulator foams prepared from mixed blowing agents)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Basf Ag; EP 0361096 A 1990 CAPLUS
(2) Basf Ag; EP 0543242 A 1993 CAPLUS
(3) Leduc, E; US 5149473 A 1992 CAPLUS
(4) Vo, C; US 5650106 A 1997 CAPLUS
(5) Voelker, H; US 5182308 A 1993 CAPLUS

L10 ANSWER 8 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2000:238061 CAPLUS
DN 132:280158
ED Entered STN: 13 Apr 2000
TI Foams having increased heat distortion temperature from blends of alkenyl aromatic polymers
IN Chaudhary, Bharat I.; Barry, Russell P.; Cirihal, Stephanie C.
PA Dow Chemical Co., USA
SO U.S., 18 pp.
CODEN: USXXAM
DT Patent
LA English
IC ICM C08J009-00
ICS B29D067-00; B32B003-26
NCL 521081000
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6048909	A	20000411	US 1998-206058	19981204
	WO 2000034364	A1	20000615	WO 1999-US27114	19991115
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	EP 1137697	A1	20011004	EP 1999-959001	19991115
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	TR 200102274	T2	20020221	TR 2001-20010227	19991115
	JP 2002531657	T2	20020924	JP 2000-586805	19991115
	NO 2001002692	A	20010709	NO 2001-2692	20010531
PRAI	US 1998-206058	A2	19981204		
	WO 1999-US27114	W	19991115		

AB The present invention pertains to improved alkenyl aromatic polymer foams (and processes for their preparation) having increased heat distortion temperature

and improved dimensional stability while maintaining good tensile/tear, creep and environmental dimensional change properties. The closed cell low d. alkenyl aromatic polymer foams exhibit increased heat distortion temperature, when substantially random interpolymers of about 21 to about 65 mol % styrene are blended in. The foams contain alkenyl aromatic polymers and copolymers of vinyl aromatic monomers and/or vinyl (cyclo)aliphatic monomers and α-olefins. When these same alkenyl aromatic polymer foams are made without these interpolymers, the heat distortion temperature is not improved. A blend contained polystyrene and ethylene-styrene copolymer (prepared using (1H-cyclopenta[1]phenanthrene-2-yl)dimethyl(t-butylamido)-silanetitanium 1,4-diphenylbutadiene catalyst).

ST polystyrene ethylene styrene copolymer foam

IT Air
(blowing agent; foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT Plastic foams
RL: TEM (Technical or engineered material use); USES (Uses)
(foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, 2-Propanol, uses 71-23-8, n-Propanol, uses 71-55-6, 1,1,1-Trichloro-ethane **74-82-8**, Methane, uses **74-84-0**, Ethane, uses 74-87-3, Methyl chloride, uses **74-98-6**, Propane, uses 75-00-3, Ethyl chloride 75-09-2, Methylene chloride, uses 75-10-5, HFC-32 **75-28-5**, Isobutane 75-37-6, HFC-152a 75-45-6, HCFC-22 75-68-3, HCFC-142b 75-69-4, CFC-11 75-71-8, CFC-12 75-73-0, Perfluoromethane 76-13-1, CFC-113 76-14-2, CFC-114 76-16-4, Perfluoroethane 76-19-7, Perfluoropropane 77-92-9, uses 78-67-1, Azodiisobutyro-nitrile 78-78-4, Isopentane 80-17-1 **106-97-8**, n-Butane, uses **109-66-0**, Pentane, uses 115-25-3, Perfluorocyclobutane 123-77-3, Azodicarbonamide 124-38-9, Carbon dioxide, uses 133-55-1, N,N'-Dimethyl-N,N'-dinitrosotere-phthalamide 144-55-8, Sodium bicarbonate, uses 306-83-2, HCFC-123 353-36-6, HFC-161 **354-33-6**, HFC-125 355-25-9, Perfluorobutane 359-35-3, HFC-134 420-45-1, 2,2-Difluoropropane 420-46-2, HFC-143a 421-07-8, 1,1,1-Trifluoropropane 463-82-1, Neopentane 593-53-3, Methyl fluoride **811-97-2**, HFC-134a 1717-00-6, HCFC-141b 2551-62-4, Sulfur hexafluoride 2837-89-0, HCFC-124 3955-25-7, Barium azodicarboxylate 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7727-37-9, Nitrogen, uses 7732-18-5, Water, uses 10105-42-7, Trihydrazino triazine 10195-67-2 10396-10-8, p-Toluene sulfonyl semi-carbazide 26638-19-7, Dichloropropane 30143-46-5 42560-98-5, Dichlorohexafluoropropane 94458-04-5, Difluoropropane
RL: NUU (Other use, unclassified); USES (Uses)
(blowing agent; foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 1109-15-5, Tris(pentafluorophenyl)borane
RL: CAT (Catalyst use); USES (Uses)
(cocatalyst; foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 25068-12-6P, Ethylene/styrene copolymer
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(foam; foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 9003-53-6, Polystyrene
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)
(foam; foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 223645-35-0P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 221527-94-2P 223645-36-1P 233674-45-8P 243458-96-0P 263713-70-8P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

IT 75-64-9, reactions 75-78-5, Dimethyldichlorosilane 235-92-7, 1H-Cyclopenta[l]phenanthrene 18039-90-2, Titanium trichloride tetrahydrofuran complex (1:3)
RL: RCT (Reactant); RACT (Reactant or reagent)
(foams having increased heat distortion temperature from blends of alkenyl aromatic polymers)

RE.CNT 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Anon; EP 0416815 A2 1990 CAPLUS
(2) Anon; EP 514828 1992 CAPLUS
(3) Anon; WO 9400500 1994 CAPLUS
(4) Anon; WO 9532095 1995 CAPLUS
(5) Anon; WO 9809999 1995 CAPLUS
(6) Brydson; Plastic Materials, 5th edition 1989, P426
(7) Canich; US 5055438 1991 CAPLUS
(8) Canich; US 5057475 1991 CAPLUS
(9) Canich; US 5096867 1992 CAPLUS
(10) Collins; US 4323528 1982
(11) Devore; US 5470993 1995 CAPLUS
(12) Frisch; Plastic Foams, Part II P544
(13) Hirosawa; US 4379859 1983 CAPLUS
(14) Imeokparia; US 5411687 1995 CAPLUS
(15) Imeokparia; US 5434195 1995 CAPLUS
(16) Imeokparia; US 5557896 1996
(17) Imeokparia; US 5693687 1997 CAPLUS
(18) Imeokparia; US 5784845 1998
(19) Imeokparia; US 5824710 1998 CAPLUS
(20) La Pointe; US 5189192 1993 CAPLUS
(21) La Pointe; US 5321106 1994 CAPLUS
(22) La Pointe; US 5721185 1998 CAPLUS
(23) Malone; US 4824720 1989
(24) Neithamer; US 5350723 1994 CAPLUS
(25) Neithamer; US 5399635 1995 CAPLUS
(26) Nickias; US 5347024 1994 CAPLUS
(27) Randall, J; Polymer Sequence Determination, Carbon 13 NMR Method 1977, P71
(28) Rosen; US 5374696 1994 CAPLUS
(29) Stevens; US 5064802 1991 CAPLUS
(30) Stevens; US 5132380 1992 CAPLUS
(31) Timmers; US 5703187 1997 CAPLUS
(32) Wiley; US 3573152 1971
(33) Yoshimura; US 4464484 1984 CAPLUS
(34) Zizsperger; US 3504068 1970 CAPLUS

L10 ANSWER 9 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:761046 CAPLUS
DN 132:3943
ED Entered STN: 02 Dec 1999
TI Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers
IN Chaudhary, Bharat I.; Hood, Lawrence S.; Barry, Russell P.; Park, Chung P.
PA The Dow Chemical Company, USA
SO U.S., 16 pp.
CODEN: USXXAM
DT Patent
LA English

IC ICM C08J009-06
ICS C08J009-08; C08J009-10; C08J009-14
NCL 264053000
CC 38-3 (Plastics Fabrication and Uses)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5993707	A	19991130	US 1998-206028	19981204
	US 6355341	B1	20020312	US 1999-387014	19990831
	WO 2000034365	A2	20000615	WO 1999-US27178	19991116
	WO 2000034365	A3	20000914		
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	EP 1135431	A2	20010926	EP 1999-968043	19991116
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	TR 200102275	T2	20011221	TR 2001-20010227519991116	
	JP 2002531658	T2	20020924	JP 2000-586806	19991116
	NO 2001002693	A	20010723	NO 2001-2693	20010531
	US 2002155270	A1	20021024	US 2002-51695	20020118
PRAI	US 1998-206028	A3	19981204		
	US 1999-387014	A3	19990831		
	WO 1999-US27178	W	19991116		

AB This invention pertains to a composition and a process for preparing a closed cell alkenyl aromatic polymer foam having enlarged cell size, comprising one or more alkenyl aromatic polymers, one or more substantially random interpolymers, one or more blowing agents having zero ozone depletion potential and optionally one or more co-blowing agents, and (or) nucleating agents and additives. This combination allows the manufacture of closed cell, low d. alkenyl aromatic polymer foams of enlarged cell size, when blowing agents of relatively high nucleation potential are employed. When such blowing agents are used with alkenyl aromatic polymers in the absence of the substantially random interpolymers, small cell foams result.

ST polyolefin large cell foams

IT Plastic foams
Polyolefins
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT Aluminoxanes
RL: CAT (Catalyst use); USES (Uses)
(iso-Bu Me, branched, cyclic and linear; Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT Polymerization catalysts
(metallocene; Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT 1109-15-5
RL: CAT (Catalyst use); USES (Uses)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT 204201-36-5P 210286-57-0P 233674-45-8P 239805-86-8P
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT **74-82-8**, Methane, uses **74-84-0**, Ethane, uses **74-98-6**, Propane, uses 75-10-5, HFC-32 **75-28-5**, Isobutane 75-37-6, HFC-152a 77-92-9, Citric acid, uses 78-67-1, Aibn 78-78-4, Isopentane 80-17-1, Benzenesulfonyl hydrazide **106-97-8**, Butane, uses **109-66-0**, Pentane, uses 123-77-3, Azodicarbonamide 124-38-9, Carbon dioxide, uses 133-55-1 144-55-8, Sodium bicarbonate, uses 287-92-3, Cyclopentane 353-36-6, HFC-161 **354-33-6**, HFC-125 359-35-3, HFC-134 420-46-2, HFC-143a 463-82-1, Neopentane **811-97-2**, HFC-134a 2551-62-4, Sulfur hexafluoride 3955-25-7, Barium azodicarboxylate 7440-37-1, Argon, uses 7727-37-9, Nitrogen, uses 10105-42-7 10195-67-2 10396-10-8, p-Toluenesulfonyl semicarbazide
RL: NUU (Other use, unclassified); USES (Uses)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT 9003-53-6, Polystyrene 25068-12-6, Styrene-ethylene copolymer
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT 14927-64-1 210286-58-1 210286-61-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

IT 210286-60-5P 221527-94-2P 221527-95-3P 223645-34-9P 223645-36-1P 243458-96-0P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(Enlarged cell foams from blends of alkenyl aromatic polymers and α-olefin/vinyl or vinylidene interpolymers)

RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Anon; EP 0416815 1990 CAPLUS
(2) Anon; EP 514828 1992 CAPLUS
(3) Anon; WO 95/32095 1995 CAPLUS
(4) Canich; US 5055438 1991 CAPLUS
(5) Canich; US 5057475 1991 CAPLUS
(6) Canich; US 5096867 1992 CAPLUS
(7) Chaudhary; US 5776389 1998
(8) Collins; US 4323528 1982
(9) Devore; US 5470993 1995 CAPLUS
(10) Hatano; US 3953558 1976 CAPLUS
(11) Hirosawa; US 4379859 1983 CAPLUS
(12) La Pointe; US 5189192 1993 CAPLUS
(13) La Pointe; US 5321106 1994 CAPLUS
(14) La Pointe; US 5721185 1998 CAPLUS
(15) Malone; US 4824720 1989
(16) Neithamer; US 5350723 1994 CAPLUS
(17) Neithamer; US 5399635 1995 CAPLUS
(18) Nickias; US 5347024 1994 CAPLUS
(19) Rosen; US 5374696 1994 CAPLUS
(20) Stevens; US 5064802 1991 CAPLUS
(21) Stevens; US 5132380 1992 CAPLUS
(22) Suh; US 4229396 1980
(23) Suh; US 5489407 1996
(24) Timmers; US 5703187 1997 CAPLUS
(25) Wiley; US 3573152 1971
(26) Zizlsperger; US 3504068 1970 CAPLUS

L10 ANSWER 10 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1999:614016 CAPLUS
DN 131:229866

ED Entered STN: 26 Sep 1999
TI Open-cell polystyrene foams from interpolymer blends
IN Park, Chung P.; Imeokparia, Daniel D.; Chaudhary, Bharat I.
PA The Dow Chemical Company, USA
SO PCT Int. Appl., 65 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C08J009-00
ICS C08L023-02; C08L025-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 29
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9947592	A1	19990923	WO 1999-US5706	19990315
	W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	CA 2324277	AA	19990923	CA 1999-2324277	19990315
	AU 9930919	A1	19991011	AU 1999-30919	19990315
	AU 747560	B2	20020516		
	US 6093752	A	20000725	US 1999-268585	19990315
	BR 9908944	A	20001114	BR 1999-8944	19990315
	EP 1068260	A1	20010117	EP 1999-912571	19990315
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE, FI				
	TR 200002668	T2	20010221	TR 2000-20000266819990315	
	JP 2002506903	T2	20020305	JP 2000-536781	19990315
	TW 457265	B	20011001	TW 1999-88104081	19990601
	US 6174471	B1	20010116	US 2000-553306	20000420
	NO 2000004632	A	20001108	NO 2000-4632	20000915
PRAI	US 1998-78091P	P	19980316		
	US 1999-268585	A3	19990315		
	WO 1999-US5706	W	19990315		

AB The title foam is formed from a blend of polystyrene and an ethylene-styrene interpolymer. The ethylene-styrene interpolymer functions as a cell opening agent, and is used to control the open cell content of the resulting foam, which may contain >80 percent open cells. The foam is produced by an extrusion process in which CO2 is used as the preferred blowing agent. The resulting foams may be formed into beads, sheets, etc.

ST polystyrene open cellular foam; ethylene styrene open cellular foam; interpolymer polystyrene blend foam; metallocene catalyst polystyrene blend foam

IT Blowing agents
(Open-cell polystyrene foams from interpolymer blends)

IT Carbon black, uses
RL: NUU (Other use, unclassified); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT Plastic foams
Polymer blends
Polyolefins
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT Polymerization catalysts
(metallocene; Open-cell polystyrene foams from interpolymer blends)

IT 204201-36-5P 210286-57-0P 210286-60-5P 210286-61-6P 210286-62-7P 223645-35-0P 233674-45-8P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT 124-38-9, Carbon dioxide, uses
RL: MOA (Modifier or additive use); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, Isopropanol, uses 71-23-8, Propanol, uses 71-55-6, 1,1,1-Trichloroethane **74-82-8**, Methane, uses **74-84-0**, Ethane, uses 74-87-3, Methyl chloride, uses **74-98-6**, Propane, uses 75-00-3, Ethyl chloride 75-09-2, uses 75-10-5, HFC-32 **75-28-5**, Isobutane 75-37-6, HFC 152a 75-45-6, HCFC-22 75-68-3, HCFC-142b 75-69-4, CFC-11 75-71-8, CFC-12 75-73-0 76-13-1, CFC-113 76-14-2, CFC-114 76-16-4 76-19-7, Perfluoropropane 77-92-9, uses 78-67-1, AIBN 78-78-4, Isopentane 80-17-1, Benzenesulfonyl hydrazide **106-97-8**, Butane, uses **109-66-0**, Pentane, uses 115-25-3, Perfluorocyclobutane 123-77-3, Diazenedicarboxamide 144-55-8, Sodium bicarbonate, uses 287-92-3, Cyclopentane 306-83-2, HCFC-123 353-36-6, Ethyl fluoride **354-33-6** 355-25-9, Perfluorobutane 359-35-3, HFC-134 420-45-1, 2,2-Difluoropropane 420-46-2, HFC 143a 421-07-8, 1,1,1-Trifluoropropane 463-82-1, Neopentane 593-53-3, Methyl fluoride **811-97-2**, HFC 134a 1717-00-6, HCFC-141b 2551-62-4, Sulfur hexafluoride 2837-89-0, HCFC-124 3851-16-9 3955-25-7 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7631-86-9, Silica, uses 7727-37-9, Nitrogen, uses 7732-18-5, Water, uses 7782-42-5, Graphite, uses 10195-67-2 10396-10-8 13463-67-7, Titanium dioxide, uses 14807-96-6, Talc, uses 26638-19-7, Dichloropropane 30143-46-5 42560-98-5, DiChlorohexafluoropropane 94458-04-5, Difluoropropane
RL: NUU (Other use, unclassified); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT 9003-53-6, Polystyrene 25068-12-6, Ethylene-styrene copolymer
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(Open-cell polystyrene foams from interpolymer blends)

IT 886-65-7, 1,4-Diphenylbutadiene 14927-64-1 223645-34-9
RL: RCT (Reactant); RACT (Reactant or reagent)
(Open-cell polystyrene foams from interpolymer blends)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Park, C; WO 9810014 A 1998 CAPLUS

L10 ANSWER 11 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:173670 CAPLUS

DN 130:302318

ED Entered STN: 17 Mar 1999

TI Solubility of gases in water: Correlation between solubility and the number of water molecules in the first solvation shell

AU Scharlin, Pirketta; Battino, Rubin; Silla, Estanislao; Tunon, Inaki; Pascual-Ahuir, Juan Luis

CS Department Chemistry, University Turku, Turku, FIN-20014, Finland

SO Pure and Applied Chemistry (1998), 70(10), 1895-1904
CODEN: PACHAS; ISSN: 0033-4545

PB Blackwell Science Ltd.

DT Journal

LA English

CC 68-1 (Phase Equilibriums, Chemical Equilibriums, and Solutions)

AB Using a new version of a program called GEPOL, a consistent set of values was computed for areas of three different kinds of surfaces for 53 gaseous solutes. These surface areas, together with the vols. of space enclosed by the surfaces, were studied. The following surfaces were identified: the van der Waals Surface (WS), the Solvent Accessible Surface (SAS) and the Solvent-Excluding Surface (SES). Values were determined for the number of water mols. (N) in the first solvation shell by a simple surface area approach from the SAS data. Values of N, as well as literature data on

solubilities of gases in water, were used to establish various semi-empirical correlations between thermodn. changes on solution and the number of water mols. in the first solvation shell.

ST mol surface gas water soly; vol surface gaseous mol soly water; rare gas water soly; alkane haloalkane Freon gas water soly

IT Alkanes, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(halo; solubility of gases in water and correlation between solubility and number of water mols. in first solvation shell)

IT Excluded volume
Hydration, chemical
Molar volume
(solvation shell studies for solubility of gases in water)

IT Gases
Hydration number
Molecular surface
Solubility
Solutes
(solubility of gases in water and correlation between solubility and number of water mols. in first solvation shell)

IT Alkanes, properties
Noble gases, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(solubility of gases in water and correlation between solubility and number of water mols. in first solvation shell)

IT Entropy
Heat capacity
Hydration enthalpy
(thermodn. characteristics of solubility of gases in water)

IT **109-66-0**, n-Pentane, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(solubility of gases in water)

IT **74-82-8**, Methane, properties 74-83-9, Bromomethane, properties **74-84-0**, Ethane, properties 74-85-1, Ethene, properties 74-86-2, Acetylene, properties 74-87-3, Chloromethane, properties **74-98-6**, Propane, properties 75-19-4, Cyclopropane **75-28-5**, 2-Methylpropane 75-37-6, 1,1-Difluoroethane 75-43-4, Dichlorofluoromethane 75-45-6, Chlorodifluoromethane 75-46-7, Trifluoromethane 75-68-3, 1-Chloro-1,1-difluoroethane 75-69-4, Trichlorofluoromethane 75-71-8, Dichlorodifluoromethane 75-72-9, Chlorotrifluoromethane 75-73-0, Tetrafluoromethane 76-13-1, 1,1,2-Trichloro-1,2,2-trifluoroethane 76-14-2, 1,2-Dichloro-1,1,2,2-tetrafluoroethane 76-15-3, 1-Chloro-1,1,2,2,2-pentafluoroethane 76-16-4, Hexafluoroethane **106-97-8**, n-Butane, properties 106-99-0, Butadiene, properties **115-07-1**, Propene, properties 115-25-3, Octafluorocyclobutane 116-15-4, Hexafluoropropene 124-38-9, Carbon dioxide, properties 306-83-2, 1,1-Dichloro-2,2,2-trifluoroethane **354-33-6**, 1,1,1,2,2-Pentafluoroethane 463-82-1, 2,2-Dimethylpropane 593-53-3, Fluoromethane 630-08-0, Carbon monoxide, properties **811-97-2**, 1,1,1,2-Tetrafluoroethane 1333-74-0, Hydrogen, properties 1717-00-6, 1,1-Dichloro-1-fluoroethane 1794-84-9, Chloronitromethane 2551-62-4, Sulfurhexafluoride 2837-89-0, 1-Chloro-1,2,2,2-tetrafluoroethane 7439-90-9, Krypton, properties 7440-01-9, Neon, properties 7440-37-1, Argon, properties 7440-59-7, Helium, properties 7440-63-3, Xenon, properties 7727-37-9, Nitrogen, properties 7782-39-0, Deuterium, properties 7782-44-7, Oxygen, properties 10024-97-2, Nitrous oxide, properties 10028-15-6, Ozone, properties 10043-92-2, Radon, properties 10102-43-9, Nitric oxide,

properties 29759-38-4, Tetrafluoroethane
RL: PEP (Physical, engineering or chemical process); PRP (Properties);
PROC (Process)
(solubility of gases in water)

RE.CNT 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Abraham, M; J Chem Soc Faraday Trans 1984, V1(80), P153
(2) Alagona, G; J Chem Phys 1980, V72, P580 CAPLUS
(3) Anon; World Meterological Organization Global Ozone research and Monitoring project - Report No 20 1989, VII
(4) Battino, R; IUPAC Solubility Data Series Oxygen and Ozone Pergamon Press 1981
(5) Battino, R; Rev Anal Chem 1989, V9, P131 CAPLUS
(6) Bondi, A; J Phys Chem 1966, V68, P441
(7) Connolly, M; QCPE Program No 75 1981
(8) Dec, S; J Solution Chem 1984, V13, P27 CAPLUS
(9) Dec, S; J Solution Chem 1985, V14, P417 CAPLUS
(10) Dec, S; J Solution Chem 1985, V14, P827 CAPLUS
(11) E I Du Pont de Nemours & Co Inc; "Freon" Fluorocarbons, Properties and Applications 1969, P9
(12) Franks, F; Water 1983, P21
(13) Gill, S; J Chem Thermodynamics 1982, V14, P905 CAPLUS
(14) Gill, S; J Phys Chem 1985, V89, P3758 CAPLUS
(15) Hayduk, W; IUPAC Solubility Data Series, Propane, Butane and 2-Methylpropane 1986, P1
(16) Hermann, R; J Phys Chem 1972, V76, P2754 CAPLUS
(17) Jorgensen, W; J Phys Chem 1985, V89, P3470 CAPLUS
(18) Kofler, M; Monatsh Chem 1923, V34, P389
(19) Kofler, M; Sitzungsber Akad Wiss Wien, Math-Naturwiss Kl 1912, V121, P2169
(20) Krause, D; J Solution Chem 1989, V18, P823 CAPLUS
(21) Lee, B; J Mol Biol 1971, V55, P379 CAPLUS
(22) Matubayasi, N; J Am Chem Soc 1994, V116, P1450 CAPLUS
(23) McLinden, M; Physical Properties of Alternatives to the Fully Halogenated Chlorofluorocarbons 1989, P11
(24) Naghibi, H; J Solution Chem 1987, V16, P171 CAPLUS
(25) Olofsson, G; J Chem Thermodynamics 1984, V16, P1041 CAPLUS
(26) Park, T; J Chem Eng Data 1982, V27, P324 CAPLUS
(27) Parmelee, H; Refrig Eng 1953, V61, P1341 CAPLUS
(28) Pascual-Ahuir, J; J Comput Chem 1990, V11, P1047 CAPLUS
(29) Pascual-Ahuir, J; J Comput Chem 1994, V15, P1127 CAPLUS
(30) Pascual-Ahuir, J; QCPE Program No 554 1988
(31) Pascual-Ahuir, J; Studies in Physical and Theoretical Chemistry 1989, V62, P597
(32) Pierotti, R; J Phys Chem 1965, V69, P281 CAPLUS
(33) Pople, J; Approximate Molecular Orbital Theory, Table 4.16 1970
(34) Rettich, T; J Phys Chem 1981, V85, P3230 CAPLUS
(35) Richards, F; Ann Rev Biophys Bioeng 1977, V6, P151 CAPLUS
(36) Scharlin, P; Fluid Phase Equilib 1994, V94, P137
(37) Scharlin, P; IUPAC Solubility Data Series Carbon Dioxide in Water and Aqueous Electrolyte Solutions 1996, P2
(38) Scharlin, P; J Solution Chem 1992, V21, P67 CAPLUS
(39) Scharlin, P; Unpublished results
(40) Silla, E; J Comput Chem 1991, V12, P1077 CAPLUS
(41) Sutton, L; Tables of Interatomic Distances and Configuration in Molecules and Ions 1958
(42) Szeparowicz, M; Sitzungsber Akad Wiss Wien, Math-Naturwiss Kl 1920, V129, P437 CAPLUS
(43) Wen, W; J Solution Chem 1979, V8, P225 CAPLUS
(44) Wilhelm, E; Chem Rev 1977, V77, P219 CAPLUS
(45) Wilhelm, E; J Chem Thermodynamics 1971, V3, P379 CAPLUS
(46) Young, C; IUPAC Solubility Data Series Hydrogen and Deuterium 1981, P1
(47) Young, C; IUPAC Solubility Data Series Oxides of Nitrogen 1981, P1

L10 ANSWER 12 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:333879 CAPLUS
DN 129:83616
ED Entered STN: 04 Jun 1998
TI Refrigerating apparatus
IN Mishina, Shotaro; Hara, Hideki; Ishia, Akira
PA Daikin Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM C10M171-00
ICS C09K005-04; F25B001-00; C10N040-30
CC 51-8 (Fossil Fuels, Derivatives, and Related Products)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10130685	A2	19980519	JP 1996-288419	19961030
PRAI	JP 1996-288419		19961030		

AB A refrigerating apparatus comprised of a refrigeration cycle containing cyclically connected compressor, condenser, throttling device, and evaporator uses hydrocarbon refrigerants and lubricating oils compatible with the hydrocarbon refrigerants. The apparatus provides improved refrigeration capacity for refrigeration systems and prevents the global warming.
ST refrigeration cycle refrigerant hydrocarbon lubricating oil
IT Lubricating oils
Refrigerants
Refrigerating apparatus
Refrigeration
(refrigerating apparatus using hydrocarbon refrigerants and lubricating oils compatible with them)
IT Naphthenic oils
Paraffin oils
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(refrigerating apparatus using hydrocarbon refrigerants and lubricating oils compatible with them)
IT **74-82-8**, Methane, uses **74-84-0**, Ethane, uses 74-85-1, Ethene, uses **74-98-6**, Propane, uses 75-10-5, HFC 32 75-19-4, Cyclopropane **75-28-5** 75-37-6, HFC 152a 75-46-7, HFC 23 78-78-4 **106-97-8**, n-Butane, uses **109-66-0**, n-Pentane, uses **115-07-1**, 1-Propene, uses 287-23-0, Cyclobutane 287-92-3, Cyclopentane **354-33-6**, HFC 125 420-46-2, HFC 143a **811-97-2**, HFC 134a 7664-41-7, Ammonia, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(refrigerant; refrigerating apparatus using hydrocarbon refrigerants and lubricating oils compatible with them)

L10 ANSWER 13 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1995:676110 CAPLUS
DN 123:86998
ED Entered STN: 14 Jul 1995
TI Component design issues and limitations with 3rd generation HFC, HC and natural refrigerants
AU Biancardi, F. R.; Sienel, T. H.; Sibley, Howard
CS United Technologies Research Center, East Hartford, CT, USA
SO Science et Technique du Froid (1994), (1, New Applications of Natural Working Fluids in Refrigeration and Air Conditioning), 365-86
CODEN: STFRD4; ISSN: 0151-1637
PB Institut International du Froid
DT Journal
LA English
CC 48-5 (Unit Operations and Processes)

AB Various benefits are examined and discussed of key Rankine cycle system and component design issues and limitations when using a wide range of single component refrigerants, hydrocarbons, natural refrigerants and blends by using computer modeling program, READER, for heating and cooling systems. The potential for using small high-speed centrifugal compressors to mech. these requirements and the state of the art are briefly described.

ST hydrocarbon refrigerant component design limitation; natural refrigerant component design limitation; computer program RADER refrigerant thermodn cycle; heating cooling system refrigerant; air conditioning refrigerant thermodn cycle

IT Hydrocarbons, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(component design issues and limitations with 3rd generation refrigerants)

IT Computer program
Thermodynamic cycle
(computer program READER for modeling of thermodn. cycle of 3rd generation refrigerants)

IT Air conditioning
(heating and cooling; computer program READER for modeling of thermodn. cycle of 3rd generation refrigerants)

IT Refrigeration
(agents, component design issues and limitations with 3rd generation refrigerants)

IT **74-98-6**, r 290, properties 75-10-5, r 32, Refrigerant 75-19-4, Rc 270 **75-28-5**, r 600a 75-37-6, r 152a 75-43-4, r 21, Refrigerant 75-45-6, r 22 75-63-8, r 13B1 75-68-3, r 142b 75-69-4, r 11, Refrigerant 75-71-8, r 12, Refrigerant 76-13-1, r 113, Halocarbon 76-14-2, r 114, Halocarbon 76-15-3, r 115 76-19-7, r 218 78-78-4, Isopentane **106-97-8**, r 600, properties **109-66-0**, Pentane, properties 115-25-3, Rc 318 306-83-2, r 123 354-23-4, r 123a **354-33-6**, r 125 359-35-3, r 134 420-46-2, r 143a 430-66-0, r 143 431-63-0, r 236Ea 431-89-0, r 227Ea 460-73-1, r 245Fa 677-56-5, r 236Cb 679-86-7, r 245Ca 690-39-1, r 236Fa **811-97-2**, r 134a 1717-00-6, r 141b 1814-88-6, r 245Cb 2252-84-8, r 227Ca 2837-89-0, r 124 3257-28-1, e 125 7664-41-7, Ammonia, properties 7732-18-5, Water, properties 40723-63-5, r 254Cb 109207-22-9, e 134
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(computer program READER for modeling of thermodn. cycle of 3rd generation refrigerants)

L10 ANSWER 14 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:708824 CAPLUS
DN 121:308824
ED Entered STN: 24 Dec 1994
TI Reference data for the thermophysical properties of cryogenic fluids
AU Haynes, W.M.; Friend, D.G.
CS Thermophysics Division, National Institute of Standards and Technology, Boulder, CO, USA
SO Advances in Cryogenic Engineering (1994), 39(Pt. B), 1865-74
CODEN: ACYEAC; ISSN: 0065-2482
PB Plenum
DT Journal
LA English
CC 65-6 (General Physical Chemistry)
Section cross-reference(s): 48, 69

AB The Thermophysics Division of the National Institute of Stds. and Technol. (NIST) has long been involved in providing standard reference data for the thermophys. properties of cryogenic fluids. Comprehensive exptl. facilities have been used to provide accurate data for PVT relations, heat capacities, sound speeds, phase equilibrium, and transport properties for a

large variety of well characterized cryogenic fluid systems. A concurrent effort, in the areas of critical data evaluation, modeling, and theory, has allowed the Division to provide correlating equations, tabular material, and computer programs which have become an integral part of the nation's Standard Reference Data program. This critically evaluated information on the thermophys. properties of fluids and fluid mixts. of cryogenic interest is used for custody transfer applications and for efficient design and operation of cryogenic processes in the chemical, natural gas, aerospace, environmental, refrigeration, and other energy related industries. Available computer programs can calculate properties of pure fluids as well as provide predictions for fluid mixts.

ST ref data thermophys property cryogenic fluid; equation state cryogenic fluid ref data; heat capacity cryogenic fluid ref data; phase equil cryogenic fluid ref data; thermal cond cryogenic fluid ref data; viscosity cryogenic fluid ref data; computer program thermophys property cryogenic fluid; database thermophys property cryogenic fluid; refrigerant thermophys property ref data

IT Computer program
(for thermophys. properties of cryogenic fluids by NIST)

IT Cryogenic materials
(reference data by NIST for thermophys. properties of)

IT Equation of state
(reference data for equation of state of cryogenic fluids by NIST)

IT Heat capacity
(reference data for heat capacity of cryogenic fluids by NIST)

IT Sound and Ultrasound
(reference data for sound velocity in cryogenic fluids by NIST)

IT Thermal conductivity and conduction
(reference data for thermal conductivity of cryogenic fluids by NIST)

IT Thermal property
(reference data for thermophys. properties of cryogenic fluids by NIST)

IT Viscosity
(reference data for viscosity of cryogenic fluids by NIST)

IT Refrigeration
(agents, reference data by NIST for thermophys. properties of)

IT Equilibrium
(liquid-vapor, reference data for liquid-vapor equilibrium of cryogenic fluids by NIST)

IT Information science and technology
(system, computerized, for thermophys. properties of cryogenic fluids by NIST)

IT **74-82-8**, Methane, properties **74-84-0**, Ethane, properties 74-85-1, Ethylene, properties **74-98-6**, Propane, properties **75-28-5**, Isobutane **106-97-8**, Butane, properties 124-38-9, Carbon dioxide, properties 630-08-0, Carbon monoxide, properties 1333-74-0, Hydrogen, properties 7440-37-1, Argon, properties 7440-59-7, Helium, properties 7440-63-3, Xenon, properties 7727-37-9, Nitrogen, properties 7732-18-5, Water, properties 7782-39-0, Deuterium, properties 7782-44-7, Oxygen, properties 7783-54-2, Nitrogen trifluoride
RL: PRP (Properties)
(reference data by NIST for thermophys. properties of)

IT 75-10-5, R 32 (Refrigerant) 75-19-4, Rc 270 75-37-6, r 152a 75-43-4, R 21 (Refrigerant) 75-45-6 75-46-7, R 23 (Halocarbon) 75-63-8, r 13b1 75-68-3, r 142b 75-69-4, R11 75-71-8, R12 75-72-9, R 13 (Refrigerant) 75-73-0, R 14 (Refrigerant) 76-13-1, r 113 (Halocarbon) 76-14-2, r 114 (Halocarbon) 76-15-3, r 115 76-19-7, r 218 78-78-4, Isopentane 107-83-5, Isohexane **109-66-0**, Pentane, properties 110-54-3, Hexane, properties 115-25-3, Rc 318 306-83-2, r 123 354-23-4, r 123a **354-33-6**, r 125 359-35-3, r 134 420-46-2, r 143a 430-66-0, r 143 431-63-0, r 236Ea 431-89-0, r 227Ea **811-97-2**, r 134a 1717-00-6, r 141b 1814-88-6, r 245Cb 2837-89-0, r 124 7664-41-7, Ammonia, properties 7783-06-4, Hydrogen

sulfide, properties 109207-22-9, e 134
RL: PRP (Properties)
(reference data by NIST for thermophys. properties of pure and mixts. of)

L10 ANSWER 15 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:704037 CAPLUS
DN 121:304037
ED Entered STN: 24 Dec 1994
TI Fluoroiodocarbon blends as CFC and Halon replacements
IN Nimitz, Jonathan S.; Lankford, Lance H.
PA USA
SO PCT Int. Appl., 68 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C09K005-04
ICS C09K003-30; A62D001-00; C08J009-14
CC 48-5 (Unit Operations and Processes)
Section cross-reference(s): 38, 50, 59
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9420588	A1	19940915	WO 1994-US2321	19940303
	W: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, UZ, VN				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
	US 5611210	A	19970318	US 1993-27227	19930305
	CA 2157567	AA	19940915	CA 1994-2157567	19940303
	AU 9463587	A1	19940926	AU 1994-63587	19940303
	EP 687287	A1	19951220	EP 1994-910828	19940303
	EP 687287	B1	20000614		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE				
	BR 9405991	A	19951226	BR 1994-5991	19940303
	CN 1122606	A	19960515	CN 1994-191986	19940303
	CN 1052031	B	20000503		
	JP 08507524	T2	19960813	JP 1994-520174	19940303
	RU 2140955	C1	19991110	RU 1995-121752	19940303
	AT 193903	E	20000615	AT 1994-910828	19940303
	US 5444102	A	19950822	US 1994-269324	19940630
	US 5605647	A	19970225	US 1994-268583	19940630
	US 5685915	A	19971111	US 1994-268587	19940630
	US 5674451	A	19971007	US 1995-401384	19950217
	US 5562861	A	19961008	US 1995-414566	19950331
	US 5716549	A	19980210	US 1996-701669	19960822
	US 5695688	A	19971209	US 1996-707960	19960910
PRAI	US 1993-27227	A	19930305		
	WO 1994-US2321	W	19940303		
	US 1995-414566	A3	19950331		

AB The fluoroiodocarbons are effective, environmentally safe, nonflammable, low-toxicity refrigerants, solvents, foam blowing agents, propellants, and fire fighting agents. The agents are clean, elec. nonconductive, and have short atmospheric lifetimes, zero ozone-depletion potential, and low global warming potentials. The agents comprise ≥1 fluoroiodocarbon satisfying the general formula: CaHbBrcCldFeIfNgOh, where a is 1-8; b is 0-2; c, d, g and h are each 0-1; e is 1-18; and f is 1-2, either neat or mixed with additives selected from the group consisting of alcs., esters, ethers, fluoroethers, hydrocarbons, hydrofluorocarbons, and perfluorocarbons.
ST fluoroiodocarbon blend CFC Halon replacement; refrigerant fluoroiodocarbon; fire extinguisher fluoroiodocarbon; solvent fluoroiodocarbon; foam blowing agent fluoroiodocarbon; propellant fluoroiodocarbon

IT Propellants
Solvents
(fluoroiodocarbon blends as CFC and Halon replacements)
IT Alcohols, uses
Esters, uses
Ethers, uses
Hydrocarbons, uses
Ketones, uses
Ligroine
Naphtha
Perfluorocarbons
Petroleum spirits
Stoddard solvent
Turpentine
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoroiodocarbon blends as CFC and Halon replacements)
IT Blowing agents
(foam; fluoroiodocarbon blends as CFC and Halon replacements)
IT Refrigeration
(agents, fluoroiodocarbon blends as CFC and Halon replacements)
IT Fire
(extinguishers, fluoroiodocarbon blends as CFC and Halon replacements)
IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoro, iodo; fluoroiodocarbon blends as CFC and Halon replacements)
IT Ethers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoroalkyl, fluoroiodocarbon blends as CFC and Halon replacements)
IT 60-29-7, uses 64-17-5, Ethanol, uses 67-56-1, Methanol, uses
67-63-0, 2-Propanol, uses 67-64-1, Acetone, uses 71-23-8, 1-Propanol,
uses 71-36-3, 1-Butanol, uses 71-41-0, 1-Pentanol, uses
74-98-6, Propane, uses 75-10-5, Difluoromethane 75-19-4,
Cyclopropane 75-21-8, Oxirane, uses **75-28-5**, Isobutane
75-37-6 75-46-7, Trifluoromethane 75-56-9, uses 75-65-0,
2-Methyl-2-propanol, uses 75-73-0, Tetrafluoromethane 76-16-4,
Hexafluoroethane 76-19-7, Octafluoropropane 78-78-4, 2-Methylbutane
78-83-1, 2-Methyl-1-propanol, uses 78-92-2, 2-Butanol 78-93-3,
Butanone, uses 79-20-9, Methyl acetate 96-14-0, 3-Methylpentane
105-37-3, Ethyl propanoate 105-46-4, sec-Butyl acetate 105-54-4, Ethyl
butanoate **106-97-8**, Butane, uses 107-08-4 108-08-7,
2,4-Dimethylpentane 108-20-3, Diisopropyl ether 108-21-4, Isopropyl
acetate 108-88-3, Toluene, uses 109-60-4, n-Propyl acetate
109-66-0, Pentane, uses 109-99-9, uses 110-19-0, Isobutyl
acetate 110-54-3, Hexane, uses 111-43-3, Di-n-propyl ether 111-65-9,
Octane, uses 111-84-2, Nonane 115-10-6, Dimethyl ether 115-25-3,
Octafluorocyclobutane 123-86-4, n-Butyl acetate 123-91-1, 1,4-Dioxane,
uses 124-18-5, Decane 138-86-3, Limonene 141-78-6, Acetic acid ethyl
ester, uses 142-82-5, Heptane, uses 142-92-7, Hexyl acetate
142-96-1, Di-n-butyl ether 287-23-0, Cyclobutane 335-58-0
354-33-6, Pentafluoroethane 354-41-6, 1,1,2,2-Tetrafluoro-1-
iodoethane 354-64-3, Pentafluoroiodoethane 354-65-4,
1,1,2,2-Tetrafluoro-1,2-diiodoethane 355-25-9, Decafluorobutane
355-42-0, Tetradecafluorohexane 355-43-1, 1-Iodotridecafluorohexane
373-53-5, Fluoroiodomethane 377-44-6 420-46-2, 1,1,1-Trifluoroethane
420-49-5, Chlorodifluoroiodomethane 421-14-7, Methyl trifluoromethyl
ether 422-91-3, 1,1,2,2,3,3-Hexafluoro-1,3-diiodopropane 423-39-2,
Nonafluoro-1-iodobutane 425-82-1 431-89-0, 1,1,1,2,3,3,3-
Heptafluoropropane 463-82-1, 2,2-Dimethylpropane 507-63-1,
1-Iodoheptadecafluorooctane 542-69-8 554-12-1, Methyl propanoate
565-59-3, 2,3-Dimethylpentane 589-34-4, 3-Methyl hexane 623-42-7,
Methyl butanoate 628-21-7 628-63-7, n-Pentyl acetate 628-77-3
629-09-4 638-79-9, 1-Iodoperfluoropentane 677-69-0,
1,1,1,2,3,3,3-Heptafluoro-2-iodopropane 678-26-2, Dodecafluoropentane
679-86-7, 1,1,2,2,3-Pentafluoropropane 753-66-2,

Bromodifluoroiodomethane 754-34-7, Heptafluoro-1-iodopropane **811-97-2**, 1,1,1,2-Tetrafluoroethane 931-91-9, Hexafluorocyclopropane 1120-21-4, Undecane 1184-76-5, Difluorodiiodomethane 1330-16-1, Pinene 1479-49-8 1493-03-4, Difluoroiodomethane 1561-52-0 1691-17-4, Bisdifluoromethyl ether 1885-48-9 2314-97-8, Trifluoroiodomethane 2356-61-8 3822-68-2, Pentafluorodimethyl ether 5764-87-4 6032-29-7, 2-Pentanol 20705-05-9, 1,1,2-Trifluoro-1-iodoethane 22485-44-5, Iodopentafluorocyclopropane 53772-78-4
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoroiodocarbon blends as CFC and Halon replacements)

L10 ANSWER 16 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:138027 CAPLUS
DN 120:138027
ED Entered STN: 19 Mar 1994
TI Flammability of alternate refrigerants
AU Richard, Robert G.; Shankland, Ian R.
CS Buffalo, NY, USA
SO Actes Congr. Int. Froid, 18th (1991), Volume 2, 384-7 Publisher: 18th Int. Congr. Refrig., Saint-Hyacinthe, Que.
CODEN: 59HQA7
DT Conference
LA English
CC 48-5 (Unit Operations and Processes)
AB The flammability properties of alternate refrigerants (pure substances and mixts.) being considered are determined using the ASTM E 681 method. The effects of ignition source, size of the vessel, moisture content of gas mixture, temperature, and mixture composition are discussed.
ST flammability alternate refrigerant; HCFC refrigerant mixt flammability detn; HFC refrigerant flammability detn
IT Flammability
(determination of, for alternate refrigerants, by ASTM E 681 method)
IT Refrigeration
(agents, determination of flammability of pure or mixture, by ASTM E 681 method)
IT **74-82-8**, Methane, properties **75-28-5**, Isobutane **106-97-8**, Butane, properties 107-31-3, Methyl formate
RL: PRP (Properties)
(flammability of, determination of, by ASTM E 681 method)
IT 75-45-6, HCFC 22 **354-33-6**, HFC 125 **811-97-2**, HFC 134a 2837-89-0, HCFC 124
RL: USES (Uses)
(refrigerant mixts. containing, flammability of, determination of, by ASTM E 681 method)
IT 71-55-6, 1,1,1-Trichloroethane **74-98-6**, Propane, uses 75-09-2, Methylene chloride, uses 75-68-3, R 142b **109-66-0**, Pentane, uses 115-10-6, Dimethyl ether 353-36-6, R 161 430-66-0, R 143 624-72-6, Freon 152 1717-00-6, R 141b 7664-41-7, Ammonia, uses
RL: USES (Uses)
(refrigerants, flammability of, determination of, by ASTM E 681 method)
IT 75-10-5, R 32 (Refrigerant) 75-37-6, R 152a 420-46-2, R 143a
RL: USES (Uses)
(refrigerants, pure or mixts., flammability of, determination of, by ASTM E 681 method)

BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2001093146 A5 20020408 AU 2001-93146 20010927

PRAI US 2000-235847P P 20000927

WO 2001-US30276 W 20010927

US 6526764

AB Invention provides fluorocarbon refrigerant compns. that offer alternatives, and are considered environmentally safe substitutes, for CFC's and HCFC's. The compns. of the invention are useful as refrigerants, including for use in chillers, aerosol propellants, metered dose inhalers, heat transfer media, gaseous dielecs., fire extinguishing agents, foam blowing agents, solvents and sterilants. The compns. of the invention are soluble in lubricating oils and are, therefore, particularly useful as R-22 retrofit fluids.

ST safe fluorocarbon refrigerant compn

IT Aerosols
(Propellants; fluorocarbon refrigerant compns.)

IT Propellants (sprays and foams)
(aerosol; fluorocarbon refrigerant compns.)

IT Hydrocarbons, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluoro; fluorocarbon refrigerant compns.)

IT Blowing agents
Electric insulators
Fire extinguishers
Foams
Refrigerants
(fluorocarbon refrigerant compns.)

IT Paraffin oils
RL: TEM (Technical or engineered material use); USES (Uses)
(fluorocarbon refrigerant compns.)

IT Polyisocyanurates
Polyurethanes, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(foams; fluorocarbon refrigerant compns. for)

IT 182971-48-8, R 414A
RL: TEM (Technical or engineered material use); USES (Uses)
(R 414B, refrigerant; fluorocarbon refrigerant compns.)

IT 158675-81-1, R 409A
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant, R 409B; fluorocarbon refrigerant compns.)

IT 158675-80-0, R 508A
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant, R 508B; fluorocarbon refrigerant compns.)

IT 74-87-3, Chloromethane, uses 75-09-2, Dichloromethane, uses 76-16-4, Hexafluoroethane
RL: TEM (Technical or engineered material use); USES (Uses)
(refrigerant, solubilizing agent; fluorocarbon refrigerant compns.)

IT 75-10-5, Difluoromethane 75-43-4, Dichlorofluoromethane 75-45-6, Chlorodifluoromethane 75-46-7, Trifluoromethane 75-68-3, 1,Chloro-1,1-difluoroethane 75-69-4, Trichlorofluoromethane 75-71-8, Dichlorodifluoromethane 75-72-9, Chlorotrifluoromethane 75-73-0, Tetrafluoromethane 76-13-1 76-14-2, 1,2-Dichloro-1,1,2,2-tetrafluoroethane 76-15-3 76-19-7, Octafluoropropane 115-25-3, Octafluorocyclobutane 306-83-2, 2,2-Dichloro-1,1,1-trifluoroethane 354-25-6, 1-Chloro-1,1,2,2-tetrafluoroethane **354-33-6**, Pentafluoroethane 406-58-6, 1,1,1,3,3-Pentafluorobutane 420-46-2, 1,1,1-Trifluoroethane 430-66-0 431-89-0, 1,1,1,2,3,3,3-Heptafluoropropane 460-73-1, 1,1,1,3,3-Pentafluoropropane 593-53-3, Fluoromethane 593-70-4, Chlorofluoromethane 690-39-1, 1,1,1,3,3,3-Hexafluoropropane **811-97-2**, 1,1,1,2-Tetrafluoroethane 1717-00-6, 1,1-Dichloro-1-fluoroethane 39432-81-0, R-502 50815-73-1, R-503 56275-41-3, R-500 56275-42-4, R-505 56275-43-5, R-506 57197-42-9, R 400 60382-53-8, R-504 70281-30-0, R 501 133023-17-3, R-410A 146732-63-0, R-401A 149437-06-9, R-402A 149437-07-0, R-403B 150621-87-7, R-507A

(Uses)
(modeling of enthalpy and entropy of pure and mixed halogenated alkane refrigerants with corresponding states method)

RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Cristofoli, G; Fluid Phase Equil 2000, V170, P23 CAPLUS
(2) Cristofoli, G; High Temp High Press 2000, V32, P423 CAPLUS
(3) Friend, D; J Phys Chem Ref Data 1991, V20, P275 CAPLUS
(4) Kamei, A; Int J Thermophys 1995, V16, P1155 CAPLUS
(5) Kruse, H; Int J Refrig 1989, V12, P62 CAPLUS
(6) Kubota, H; J Chem Eng Jpn 1990, V23, P155 CAPLUS
(7) Kubota, H; J Chem Eng Jpn 1990, V23, P638 CAPLUS
(8) Lee, B; AIChE J 1975, V21, P510 CAPLUS
(9) Majer, V; IUPAC chem data series 1985, 32
(10) Mears, W; Ind Eng Chem 1955, V47, P1449 CAPLUS
(11) Outcalt, S; Int J Thermophys 1995, V16, P79 CAPLUS
(12) Outcalt, S; Int J Thermophys 1997, V18, P1445 CAPLUS
(13) Penoncello, G; Fluid Phase Equil 1992, V80, P45
(14) Penoncello, G; Fluid Phase Equil 1992, V80, P57
(15) Platzer, B; Thermoplastic properties of refrigerants 1990
(16) Scalabrin, G; Fluid Phase Equil 2002, V199, P79 CAPLUS
(17) Scalabrin, G; Int J Refrig 2003, V26, P35 CAPLUS
(18) Setzmann, U; J Phys Chem Ref Data 1991, V20, P1061 CAPLUS
(19) Starling, K; Fluid thermodynamic properties for light petroleum systems 1973
(20) Strom, K; Can J Chem Eng 1993, V71, P940
(21) Teja, A; AIChE J 1980, V26, P337 CAPLUS
(22) Tillner-Roth, R; Int J Thermophys 1995, V16, P91 CAPLUS
(23) Tillner-Roth, R; J Chem Thermodynamics 1993, V25, P1419 CAPLUS
(24) Tillner-Roth, R; J Phys Chem Ref Data 1994, V23, P657 CAPLUS
(25) Tillner-Roth, R; Thermodynamic properties of pure and blended hydrofluorocarbons (HFC) refrigerants 1998
(26) Ulen, N; Proc ASME WAM 1993
(27) Weber, L; Proc 18th Int Cong Refrig 1991, V616
(28) Wong, D; Fluid Phase Equil 1983, V14, P79 CAPLUS
(29) Younglove, B; J Phys Chem Ref Data 1987, V16, P577 CAPLUS

L10 ANSWER 5 OF 16 CAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:256407 CAPLUS
DN 136:296540
ED Entered STN: 05 Apr 2002
TI Fluorocarbon refrigerant compositions

IN Singh, Rajiv R.; Spatz, Mark W.; Richard, Robert G.; Thomas, Raymond G.; Wilson, David P.
PA Honeywell International Inc., USA

SO PCT Int. Appl., 21 pp.
CODEN: PIXXD2
DT Patent
LA English
IC C09K005-04
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002026913	A2	20020404	WO 2001-US30276	20010927
	WO 2002026913	A3	20020530		

W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,